**Dr. Google: Navigating the World of Online Health Information**

 The influence of the Internet is so pervasive in Canada that online connectivity has become inescapably molded into many aspects of everyday life. Up to 87% of Canadian households are currently connected to the Internet, and social media websites rank among the most highly visited pages among Canadian Internet users (1). In fact, Canadians are the most active Facebook users globally, with over 19 million users who log on at least monthly (2). Due to the explosion in popularity of social media in Canada and across the world over the previous decade, the dynamics of Internet marketing have shifted, with an increasing proportion of marketers currently targeting social media users. Coupled with the fact that many individuals often turn to the Internet as their first source for health information, these trends indicate that the average Canadian Internet user will be exposed to many health-related advertisements and biased sources of information, even during routine browsing of social media pages. An awareness of these trends is important for healthcare professionals in order to better anticipate the types of information patients may be exposed to, as well as to provide education and guidance on navigating the online world as an informed Internet user.

Basics of Search Engine Optimization and Online Advertising

 Online advertising has changed dramatically since the first classic rectangular banner ad went live in 1994 (3). Since that time, Internet marketers have increasingly focused on search engines as a means of reaching the largest potential pool of customers, and paid advertisements currently form a major source of revenue for search engines like Google and Yahoo (4). These paid advertisements appear at the top of search engine listings above the “organic” search results (i.e. the non-paid search results) under headings such as “Ads” or “Sponsored”. Behind search terms related to legal and insurance services, search terms related to healthcare are among the terms with the highest cost-per-click (CPC) rates (often in the hundreds of dollars), serving as a testament to the size of the online health industry (5). Aside from sponsored search engine listings, Search Engine Optimization (SEO) strategies have emerged as another cornerstone of modern Internet marketing. Through SEO, webmasters make use of efficient keywords, tags, and titles in order to have their webpages rank highly in the organic results of major search engines (6). When a search engine like Google indexes the content of a webpage, it uses an algorithm that analyzes the keywords and tags on that webpage in order to determine how highly that page will rank in its search results (6), regardless of the reliability of the information presented on that page. It is therefore inevitable that misinformation will be propagated through search engines; as an example, a recent study evaluating Google search results for simple queries including the phrase “human papillomavirus vaccine” revealed that up to 27% of results contained highly dissuasive and/or factually inaccurate information about the vaccine (7). This illustrates just one of the many examples of ways in which Internet users can be misled while searching for healthcare information online.

Next Steps: Social Media Marketing

 Following the rise of social media websites like MySpace and Facebook in the early 2000s, a broader arsenal of tools and options became available to Internet marketers than ever before. With the advent of marketing technology that made it possible to correlate Internet cookies from search engines like Google with cookies from social networking websites like Facebook, marketers soon gained the ability to display customized ads on social media websites based on a user’s previous Google searches (8). Social media advertising has grown exponentially in recent years, with revenue for these particular types of ads projected to reach $11 billion USD in 2017 in the United States alone (9). Unfortunately, the rise of social media marketing has also ushered in new avenues of deceptive online marketing practices. As an example, unscrupulous marketers may utilize fraudulent social media profiles to distribute biased product reviews, with recent conservative estimates placing the rate of such fraudulent reviews at approximately 15% (10). This is particularly concerning given that reports have indicated that up to 88% of online consumers stated that they place the same amount of trust in online reviews as they do with personal recommendations (11). These observations are of no small significance in the online health industry, where monthly searches for health information centered around terms such as “diet” and “weight loss” are in the millions (12), and the annual revenue generated by the online vitamin and nutritional supplement market targeted to such searches is approximately $7 billion USD (13). Considering these trends of consumer behavior within a climate of Internet marketing practices such as SEO, customized social media advertisements, as well as fraudulent product reviews, it is evident that the uninformed consumer is particularly vulnerable to the tactics and manipulation of deceptive marketers when browsing health information on the Internet.

Web 2.0 and a New Era of Online Health Information

 Although examples abound of inaccurate sources of online health information, with a simple understanding of the basic workings of the Internet, healthcare professionals can begin to combat this problem and help their patients avoid falling victim to the veritable maze of deceptive marketing and unfounded claims that exist on the web. In fact, some physicians have even taken a proactive approach to this issue, establishing their own personal blogs and websites in order to provide reputable sources of online health information. As an example, internal medicine physician Kevin Pho founded KevinMD.com in 2004, a website which has grown to become a leading social media platform in the healthcare sector and currently receives contributions from over 2,000 authors (14). An important feature of this website is that it embodies many aspects of so-called “Web 2.0”, a conceptual term that has been used to describe modern websites that include such features as user-generated content, interactivity, and connectivity with other social media platforms, among others (15). Interestingly, a recent study examining the dissemination of vaccination information compared representative anti-vaccine and pro-vaccine websites and found that the anti-vaccine websites took advantage of more features of Web 2.0, including user connectivity and testimonials, relative to the pro-vaccine websites, which were mostly formal, encyclopedia-like resources (16). Although the implications of these findings remain to be clarified through further research, given the ongoing rise in popularity of social media (2), it is conceivable that the average Internet user may respond more favorably to websites incorporating features of Web 2.0. With this in mind, an opportunity may therefore exist for the establishment of more websites run by healthcare professionals, incorporating key features of Web 2.0, in order to temper the online pollution of misinformation that currently exists.

 The fact that patients will seek health information online is an inescapable reality of the present era. Among many physicians, the traditional approach to this problem has often been to dismiss all sources of online health information as untrustworthy and to scold patients anytime they confess to entering symptoms in an online search box. Rather than adopting this simplistic approach, it could be argued that modern physicians have a duty to take a more proactive approach and inform themselves about the Internet in order to understand the types of information their patients will encounter. For those physicians who are motivated, helping to establish reputable sources of online patient-friendly information that incorporate features of Web 2.0 and that will reach the largest audience possible could help to pioneer a new era of online health information. Through this strategy, we may reach a day where reputable websites overshadow the commercialized and biased ones, and *Dr. Google* may become a trustworthy source of health information, rather than one to be avoided altogether.

**References**

(1) The Canadian Internet. 2016; Available at: https://cira.ca/factbook/2014/the-canadian-internet.html.

(2) Canadians are the most active Facebook users in the world. 2013; Available at: http://www.adweek.com/socialtimes/canadians-still-the-most-active-facebook-users-in-the-world/295589.

(3) Oct. 27, 1994: Web Gives Birth to Banner Ads. 2010; Available at: https://www.wired.com/2010/10/1027hotwired-banner-ads/.

(4) Google's Ad Machine Is Even More Profitable Than Anyone Knew. 2016; Available at: http://www.forbes.com/sites/roberthof/2016/02/01/googles-ad-machine-is-even-more-profitable-than-anyone-knew/#2998db8c7e7a.

(5) The most expensive 100 Google Adwords keywords in the US. 2016; Available at: https://searchenginewatch.com/2016/05/31/the-most-expensive-100-google-adwords-keywords-in-the-us/.

(6) Search Engine Optimization Starter Guide. 2010;1.

(7) Pias-Peleteiro L, Cortes-Bordoy J, Martinon-Torres F. Dr. Google: what about the human papillomavirus vaccine? Hum Vaccin Immunother 2013 Aug;9(8):1712-1719.

(8) Facebook Keeps Its Ad Machine Rolling With New Ad Targeting. 2016; Available at: http://www.forbes.com/sites/roberthof/2016/05/10/facebook-keeps-its-ad-machine-rolling-with-new-ad-targeting/#6b2706eb3dc6.

(9) U.S. Social Ad Revenues to Reach $11B in 2017. 2013; Available at: http://www.biakelsey.com/u-s-social-ad-revenues-to-reach-11b-in-2017/.

(10) Gartner: 10-15 Percent Of Social Media Reviews To Be Fake By 2014, Paid For By Companies. 2012; Available at: http://www.ibtimes.com/gartner-10-15-percent-social-media-reviews-be-fake-2014-paid-companies-793144.

(11) How Important Are Customer Reviews For Online Marketing?. 2015; Available at: http://www.forbes.com/sites/jaysondemers/2015/12/28/how-important-are-customer-reviews-for-online-marketing/#71bc2f12788c.

(12) America's Obsession With Losing Weight Fast: Analyzing Google Search Data. 2011; Available at: http://www.businessinsider.com/americas-obsession-with-losing-weight-fast-analyzing-google-search-data-2011-12.

(13) Online Vitamin and Supplement Sales in the US: Market Research Report. November 1, 2015 2015;1.

(14) About KevinMD.com. 2016; Available at: http://www.kevinmd.com/blog/about-kevin-md.

(15) Cormode G, Krishnamurthy B. Key differences between Web 1.0 and Web 2.0. 2008 May 20, 2008;13(6).

(16) Grant L, Hausman BL, Cashion M, Lucchesi N, Patel K, Roberts J. Vaccination persuasion online: a qualitative study of two provaccine and two vaccine-skeptical websites. J Med Internet Res 2015 May 29;17(5):e133.